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Engineering Design File

PROJECT FILE NO. 020996

Staging, Storage, Sizing and Treatment Facility

INTEC Fire Water System for the ICDF Complex

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho

Idaho National Engineering and Environmental Laboratory

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ENGINEERING DESIGN FILE

1. Title: Staging Storage Stabilization and Treatment Facility-INTEC Fire Water System

2. Project File No.: 020996

3. Index Codes:
   Building/Type _____ SSC ID _____ Site Area INTEC

4. Summary:

This EDF uses the existing INTEC underground fire water supply and the operation of a single INTEC fire pump to hydraulically calculate and verify the availability of fire water to support the proposed Staging Storage Stabilization and Treatment Facility (SSSTF). Hydraulic calculations for this EDF were made using WaterCAD Version 4.1.1 by Haestad Methods, Inc.

Using a 2-hour duration fire event, this analysis determines flow and pressure available for the different elapsed time intervals for the most hydraulically remote point located at the west end of the proposed SSSTF (Hydraulic Calculation Point-1).

In addition, hydraulic calculations were made to determine the flow and pressure available at the south end SSSTF connection point (Hydraulic Calculation Point-2) for the proposed INEEL Comprehensive Environmental Response, Compensation and Liability Act Disposal Facility (ICDF). These calculations were made for water supply levels decreasing over a 2-hour duration event. As fire water is used during a 2-hour event, the water supply head levels are decreased. This leads to an associated decrease in available water pressure for the same demand water flow.

Additional calculations were made to show what the available pressure would be if an optional section of underground main were added to provide a looped arrangement of the proposed underground system. The piping and optional looped arrangements are illustrated in attached Drawings FP-1 and FP-2.

5. Review (R) and Approval (A) and Acceptance (Ac) Signatures:
   (See instructions for definitions of terms and significance of signatures.)

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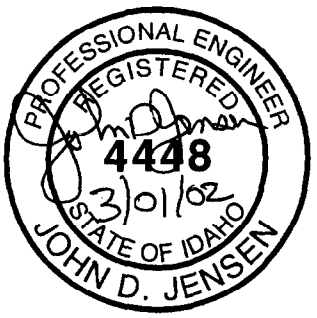


Background:

The fire water system is a supply, storage and distribution system that supplies water to the fire suppression systems at INTEC. It is a raw water system that is independent of the potable water system. The system consists of two deep well pumps, water storage tanks, fire pumps, and make-up pumps, and distribution piping, isolation valves, and fire hydrants. The fire water system is not considered a safety-class or a safety-significant system.

The system was designed to be a fully redundant system to maintain its availability during an emergency. The system is designed and installed so that either deep well pump can fill both storage tanks; each water storage tank and fire pump can support the maximum water demand rate.

The fire water storage system consists of two 60-ft diameter by 40-ft high, seismically qualified water storage tanks, each with a nominal capacity of 750,000 gallons, supplied independently by two deep wells and pumps. Located on the northwest corner of INTEC, these tanks supply both the fire water distribution system and the raw water system storage tanks. Potable water is supplied from separate wells.

Water supply to the fire tanks is controlled by level switches in both the fire watertanks and the raw water tanks. When the level of water drops in the raw watertanks, a signal is transmitted to the deep well pumps to start. The deep well pumps fill the fire water tanks to a level of 30 feet or 630,000 gallons, at which point the water overflows into a standpipe that supplies the raw water tanks. When the water reaches a high level indicator in the raw water tanks, a signal is sent to shut off the deep well pumps. A minimum of 450,000 gallons is reserved in each of the fire water storage tanks.

Each fire water storage tank (VES-UTI-1 I 1 and VES-UTI-112) has an associated fire pump (P-UTI-672 and P-UTI-673) and pump house (CPP-1642 and CPP-1643). The fire water storage tanks and pump systems are independent, but supply a common water distribution system. Each fire pump is an Aurora Model 8-481-17B, rated for 2,500 gpm at 125 psi, powered by a Caterpillar Model 3406B-DIT turbo charged diesel driver, rated at 1,750 rpm producing 370 hp, derated to 302.7 hp due to elevation. The fire pumps are controlled by electronic Firetrol Model FTA-1100-RRL-24-N diesel engine fire pump controllers. All equipment in the fire water pump trains is UL Listed and FM approved.

The fire water distribution system static pressure is maintained by two electric make-up pumps located in the northwest corner of CPP-606. The pumps are Durco Mark III Group II pumps rated for 300 gpm at 160 psi. These pumps were originally designed to minimize pressure fluctuations from non-fire suppression demands on the system. Some of these demands on the system have been removed, which enabled the pump to maintain the system pressure at 160 psi. To reduce this high system pressure the pump impellers were shaved.

One make-up pump maintains the static pressure of the main water distribution system at approximately 135 psi when there is little or no demand on the system. If the water pressure in the main water distribution system drops to 125 psi, the second make-up pump starts. If the pressure in

the main water distribution system continues to drop and reaches 120 psi, the fire pump sequential timers start.

There is a sequential timer in each of the fire pump control panels. The sequential timer starts when the system pressure drops to 120 psi. A pressure of 140 psi must be developed to stop and reset the sequential timer. If the system pressure has not recovered to greater than 140 psi within 30 seconds, the primary fire pump starts. If the stop pressure has not developed within 50 seconds, the secondary fire pump starts. The fire pumps are configured to be manually shut off. At the time of the annual pump test the pump start sequence, primary and secondary, is reversed.

Methodology:
This analysis hydraulically calculates available water supplies using a proposed 12 inch PVC fire line connection to the existing INTEC underground fire mains for the new proposed ICDF complex. The diameter and length of existing mains analyzed were obtained from file drawings. Main sizes and lengths for the SSSTF were obtained from preliminary design sketches. WaterCad Version 4.1.1 was used to hydraulically analyze and perform the calculations. Design demands for the SSSTF and the ICDF were not readily available so assumptions were made as to the amount of water required for a fire event. Therefore it was opted to error on the conservative side for available water.

Assumptions:
(1) Not knowing the design requirements at the time of this analysis, it was assumed that some worst case industry buildings would require a density of 0.25 gpm/sq. ft. over the hydraulically remote 5000 sq. ft.
(2) Buildings of this occupancy typically require an additional 500 gpm for hose streams.
(3) In addition to a building fire, it was assumed that water should be available for concurrent exposure range fire. For a concurrent range fire, an additional 1250 gpm was used in the calculations.

Conclusions:

Without Optional Looped Fire Main Arrangement:
With one pump operating (Pump No.672) and the other pump in reserve, it was calculated that Point-1, using a dead in run, and at the end of a 2-hour duration fire event, there is a demand flow available of 3000 gpm at a residual pressure of 71 psi. This point and available supply should be used for SSSTF design fire protection systems.

With one pump operating (Pump No.672) and the other pump in reserve, it was calculated that Point-2, using a dead in run, and at the end of a 2-hour duration fire event, there is a demand flow available of 3000 gpm at a residual pressure of 76 psi. This point and available supply should be used for ICDF design fire protection systems.

With Optional Looped Fire Main Arrangement:
An additional hydraulic analysis was made to determine the effects on the water supply if an optional portion of piping is used in the proposed underground main to be looped back to an existing 12 inch diameter underground main located inside the INTEC facility. The calculated reports summary tables for Hydraulic Report-2 and Report-4 illustrate that if the underground fire main is

looped back to INTEC, then the residual pressure increases approximately 20 psi. at both Hydraulic Calculation Point-1 and at Hydraulic Calculation Point-2.

Additional Information

This analysis also determined the expected water pressure available for a two-hour expected fire duration and the effects of the lowered water levels throughout the fire duration on the available delivered pressure at both the proposed SSSTF and the ICDF calculation points. These are summarized in the tables on the attached reports.

References:

INTEC Fire Protection System Plot Plant Drawing No. 056593, Index Code No. 200-0200-65-530.

Detailed Report for Pressure Junction: Test Point 1
WITHOUT OPTIONAL LOOPED FIRE MAIN

Scenario Summary	
Label	SSSTF Option 1
Physical Alternative	Physical-SSSTF Option 1
Demand Alternative	Demand-SSSTF Option 1
Initial Settings Alternative	Initial Settings-SSSTF Option 1
Operational Alternative	Operational-SSSTF Option 1
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Cost Alternative	Base-Cost
User Data Alternative	Base-User Data

Calibration Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	-692,709.61 ft	Elevation	0.00 ft
Y	294,677.55 ft	Zone	Zone-1

Demand Summary

Type	Demand (gpm)	Pattern
Demand	3,000.00	Fixed

User Data			
Observed Pressure	0.00 psi	Observed Concentration	0.00 mg/l
SCADA ID		Sampling Point	false
Hydrant Location	false	Existing	false

History:

Location Description:

Calculated Results Summary

Time	Elevation (ft)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (Calculated) (gpm)
0.00 hr	0.00	182.82	79.06	182.82	3,000.00
0.25 hr	0.00	180.69	78.14	180.69	3,000.00
0.50 hr	0.00	178.56	77.22	178.56	3,000.00
0.75 hr	0.00	176.44	76.30	176.44	3,000.00
1.00 hr	0.00	174.31	75.38	174.31	3,000.00
1.25 hr	0.00	172.18	74.46	172.18	3,000.00
1.50 hr	0.00	170.05	73.54	170.05	3,000.00
1.75 hr	0.00	167.93	72.62	167.93	3,000.00
2.00 hr	0.00	165.80	71.70	165.80	3,000.00

Detailed Report for Pressure Junction: Test Point 1
WITH OPTIONAL LOOPED FIRE MAIN TO INTEC

Scenario Summary	
Label	SSSTF Option 1
Physical Alternative	Physical-SSSTF Option 1
Demand Alternative	Demand-SSSTF Option 1
Initial Settings Alternative	Initial Settings-SSSTF Option 1
Operational Alternative	Operational-SSSTF Option 1
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Cost Alternative	Base-Cost
User Data Alternative	Base-User Data

Calibration Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	-692,709.61 ft	Elevation	0.00 ft
Y	294,677.55 ft	Zone	Zone-1

Demand Summary

Type	Demand (gpm)	Pattern
Demand	3,000.00	Fixed

User Data			
Observed Pressure	0.00 psi	Observed Concentration	0.00 mg/l
SCADA ID		Sampling Point	false
Hydrant Location	false	Existing	false

History:

Location Description:

Calculated Results Summary

Time	Elevation (ft)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (Calculated) (gpm)
0.00 hr	0.00	227.47	98.37	227.47	3,000.00
0.25 hr	0.00	225.34	97.45	225.34	3,000.00
0.50 hr	0.00	223.22	96.53	223.22	3,000.00
0.75 hr	0.00	221.09	95.61	221.09	3,000.00
1.00 hr	0.00	218.96	94.69	218.96	3,000.00
1.25 hr	0.00	216.83	93.77	216.83	3,000.00
1.50 hr	0.00	214.71	92.85	214.71	3,000.00
1.75 hr	0.00	212.58	91.93	212.58	3,000.00
2.00 hr	0.00	210.45	91.01	210.45	3,000.00

REPORT-2

Detailed Report for Pressure Junction: Test Point 2
WITHOUT OPTIONAL LOOPED FIRE MAIN

Scenario Summary	
Label	SSSTF Option 1
Physical Alternative	Physical-SSSTF Option 1
Demand Alternative	Demand-SSSTF Option 1
Initial Settings Alternative	Initial Settings-SSSTF Option 1
Operational Alternative	Operational-SSSTF Option 1
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Cost Alternative	Base-Cost
User Data Alternative	Base-User Data

Calibration Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	-692,640.61 ft	Elevation	0.00 ft
Y	295,476.55 ft	Zone	Zone-1

Demand Summary

Type	Demand (gpm)	Pattern
Demand	3,000.00	Fixed

User Data			
Observed Pressure	0.00 psi	Observed Concentration	0.00 mg/l
SCADA ID		Sampling Point	false
Hydrant Location	false	Existing	false

History:

Location Description:

Calculated Results Summary

Time	Elevation (ft)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (Calculated) (gpm)
0.00 hr	0.00	194.78	84.23	194.78	3,000.00
0.25 hr	0.00	192.65	83.31	192.65	3,000.00
0.50 hr	0.00	190.52	82.39	190.52	3,000.00
0.75 hr	0.00	188.39	81.47	188.39	3,000.00
1.00 hr	0.00	186.26	80.55	186.26	3,000.00
1.25 hr	0.00	184.14	79.63	184.14	3,000.00
1.50 hr	0.00	182.01	78.71	182.01	3,000.00
1.75 hr	0.00	179.88	77.79	179.88	3,000.00
2.00 hr	0.00	177.75	76.87	177.75	3,000.00

Detailed Report for Pressure Junction: Test Point 2
WITH OPTIONAL LOOPED FIRE MAIN TO INTEC

Scenario Summary	
Label	SSSTF Option 1
Physical Alternative	Physical-SSSTF Option 1
Demand Alternative	Demand-SSSTF Option 1
Initial Settings Alternative	Initial Settings-SSSTF Option 1
Operational Alternative	Operational-SSSTF Option 1
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Cost Alternative	Base-Cost
User Data Alternative	Base-User Data

Calibration Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	-692,640.61 ft	Elevation	0.00 ft
Y	295,476.55 ft	Zone	Zone-1

Demand Summary

Type	Demand (gpm)	Pattern
Demand	3,000.00	Fixed

User Data			
Observed Pressure	0.00 psi	Observed Concentration	0.00 mg/l
SCADA ID		Sampling Point	false
Hydrant Location	false	Existing	false

History:

Location Description:

Calculated Results Summary

Time	Elevation (ft)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (Calculated) (gpm)
0.00 hr	0.00	240.89	104.17	240.89	3,000.00
0.25 hr	0.00	238.76	103.25	238.76	3,000.00
0.50 hr	0.00	236.63	102.33	236.63	3,000.00
0.75 hr	0.00	234.51	101.41	234.51	3,000.00
1.00 hr	0.00	232.38	100.49	232.38	3,000.00
1.25 hr	0.00	230.25	99.57	230.25	3,000.00
1.50 hr	0.00	228.12	98.65	228.12	3,000.00
1.75 hr	0.00	226.00	97.73	226.00	3,000.00
2.00 hr	0.00	223.87	96.81	223.87	3,000.00

REPORT-4

HYDRAULIC SUMMARY TEST POINT-1

0.0 hours - Hydraulic Summary

Iteration Summary	
Balanced	Trials = 5, Accuracy = 0.000103
Flow Summary	
Flow Supplied	0.00 gpm
Flow Demanded	3,000.00 gpm
Flow Stored	-3,000.00 gpm
Boundary Summary	
VES-UTI-111	Tank: Closed Or Stagnant, Tank Level = 35.00 ft
VES-UTI-112	Tank: Emptying, Tank Level = 35.00 ft
Pipe Summary	
P-211	Check Valve?: Open
P-421	Check Valve?: Open
P-423	Check Valve?: Open
Pump Summary	
Pump 672	Pump: Off
PMP-673	Pump: On

** Warnings and Information **

>>>> Warning: The following elements are disconnected (isolated) from the system, as by closed pipes, pumps, and valves:

0.25 hours - Hydraulic Summary

Iteration Summary	
Balanced	Trials = 1, Accuracy = 0.0
Flow Summary	
Flow Supplied	0.00 gpm
Flow Demanded	3,000.00 gpm
Flow Stored	-3,000.00 gpm
Boundary Summary	
VES-UTI-111	Tank: Closed Or Stagnant, Tank Level = 35.00 ft
VES-UTI-112	Tank: Emptying, Tank Level = 32.87 ft
Pipe Summary	
P-211	Check Valve?: Open
P-421	Check Valve?: Open
P-423	Check Valve?: Open
Pump Summary	
Pump 672	Pump: Off
PMP-673	Pump: On

** Warnings and Information **

>>>> Warning: The following elements are disconnected (isolated) from the system, as by closed pipes, pumps, and valves:

0.5 hours - Hydraulic Summary

Iteration Summary	
Balanced	Trials = 1, Accuracy = 0.0
Flow Summary	
Flow Supplied	0.00 gpm
Flow Demanded	3,000.00 gpm
Flow Stored	-3,000.00 gpm

```
---------------------------------------------------------------
 Boundary Summary
 VES-UTI-111      Tank: Closed Or Stagnant, Tank Level = 35.00 ft
 VES-UTI-112      Tank: Emptying, Tank Level = 30.74 ft
---------------------------------------------------------------
 Pipe Summary
 P-211            Check Valve?: Open
 P-421            Check Valve?: Open
 P-423            Check Valve?: Open
---------------------------------------------------------------
 Pump Summary
 Pump 672         Pump: Off
 PMP-673          Pump: On
---------------------------------------------------------------
 ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
 from the system, as by closed pipes, pumps, and valves:

===============================================================
0.75 hours - Hydraulic Summary
---------------------------------------------------------------
 Iteration Summary
 Balanced         Trials = 1, Accuracy = 0.0
---------------------------------------------------------------
 Flow Summary
 Flow Supplied    0.00 gpm
 Flow Demanded    3,000.00 gpm
 Flow Stored      -3,000.00 gpm
---------------------------------------------------------------
 Boundary Summary
 VES-UTI-111      Tank: Closed Or Stagnant, Tank Level = 35.00 ft
 VES-UTI-112      Tank: Emptying, Tank Level = 28.62 ft
---------------------------------------------------------------
 Pipe Summary
 P-211            Check Valve?: Open
 P-421            Check Valve?: Open
 P-423            Check Valve?: Open
---------------------------------------------------------------
 Pump Summary
 Pump 672         Pump: Off
 PMP-673          Pump: On
---------------------------------------------------------------
 ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
 from the system, as by closed pipes, pumps, and valves:

===============================================================
1.0 hours - Hydraulic Summary
---------------------------------------------------------------
 Iteration Summary
 Balanced         Trials = 1, Accuracy = 0.0
---------------------------------------------------------------
 Flow Summary
 Flow Supplied    0.00 gpm
 Flow Demanded    3,000.00 gpm
 Flow Stored      -3,000.00 gpm
---------------------------------------------------------------
 Boundary Summary
 VES-UTI-111      Tank: Closed Or Stagnant, Tank Level = 35.00 ft
 VES-UTI-112      Tank: Emptying, Tank Level = 26.49 ft
---------------------------------------------------------------
 Pipe Summary
 P-211            Check Valve?: Open
 P-421            Check Valve?: Open
 P-423            Check Valve?: Open
---------------------------------------------------------------
 Pump Summary
 Pump 672         Pump: Off
 PMP-673          Pump: On
```

```
    ----------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

================================================================
1.25 hours - Hydraulic Summary
    ----------------------------------------------------------------
     Iteration Summary
     Balanced        Trials = 1, Accuracy = 0.0
    ----------------------------------------------------------------
     Flow Summary
     Flow Supplied   0.00 gpm
     Flow Demanded   3,000.00 gpm
     Flow Stored     -3,000.00 gpm
    ----------------------------------------------------------------
     Boundary Summary
     VES-UTI-111     Tank: Closed Or Stagnant, Tank Level = 35.00 ft
     VES-UTI-112     Tank: Emptying, Tank Level = 24.36 ft
    ----------------------------------------------------------------
     Pipe Summary
     P-211           Check Valve?: Open
     P-421           Check Valve?: Open
     P-423           Check Valve?: Open
    ----------------------------------------------------------------
     Pump Summary
     Pump 672        Pump: Off
     PMP-673         Pump: On
    ----------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

================================================================
1.5 hours - Hydraulic Summary
    ----------------------------------------------------------------
     Iteration Summary
     Balanced        Trials = 1, Accuracy = 0.000001
    ----------------------------------------------------------------
     Flow Summary
     Flow Supplied   0.00 gpm
     Flow Demanded   3,000.00 gpm
     Flow Stored     -3,000.00 gpm
    ----------------------------------------------------------------
     Boundary Summary
     VES-UTI-111     Tank: Closed Or Stagnant, Tank Level = 35.00 ft
     VES-UTI-112     Tank: Emptying, Tank Level = 22.23 ft
    ----------------------------------------------------------------
     Pipe Summary
     P-211           Check Valve?: Open
     P-421           Check Valve?: Open
     P-423           Check Valve?: Open
    ----------------------------------------------------------------
     Pump Summary
     Pump 672        Pump: Off
     PMP-673         Pump: On
    ----------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

================================================================
1.75 hours - Hydraulic Summary
    ----------------------------------------------------------------
     Iteration Summary
     Balanced        Trials = 1, Accuracy = 0.0
    ----------------------------------------------------------------
     Flow Summary
     Flow Supplied   0.00 gpm
```

```
     Flow Demanded   3,000.00 gpm
     Flow Stored     -3,000.00 gpm
    ------------------------------------------------------------
     Boundary Summary
     VES-UTI-111     Tank: Closed Or Stagnant, Tank Level = 35.00 ft
     VES-UTI-112     Tank: Emptying, Tank Level = 20.11 ft
    ------------------------------------------------------------
     Pipe Summary
     P-211           Check Valve?: Open
     P-421           Check Valve?: Open
     P-423           Check Valve?: Open
    ------------------------------------------------------------
     Pump Summary
     Pump 672        Pump: Off
     PMP-673         Pump: On
    ------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

============================================================
2.0 hours - Hydraulic Summary
    ------------------------------------------------------------
     Iteration Summary
     Balanced        Trials = 1, Accuracy = 0.0
    ------------------------------------------------------------
     Flow Summary
     Flow Supplied   0.00 gpm
     Flow Demanded   3,000.00 gpm
     Flow Stored     -3,000.00 gpm
    ------------------------------------------------------------
     Boundary Summary
     VES-UTI-111     Tank: Closed Or Stagnant, Tank Level = 35.00 ft
     VES-UTI-112     Tank: Emptying, Tank Level = 17.98 ft
    ------------------------------------------------------------
     Pipe Summary
     P-211           Check Valve?: Open
     P-421           Check Valve?: Open
     P-423           Check Valve?: Open
    ------------------------------------------------------------
     Pump Summary
     Pump 672        Pump: Off
     PMP-673         Pump: On
    ------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

============================================================
Message Summaries
============================================================
Time 0.0 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
------------------------------------------------------------
Time 0.25 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
------------------------------------------------------------
Time 0.5 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
------------------------------------------------------------
Time 0.75 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
```

```
     closed pipes or pumps.
---------------------------------------------------------------------
Time 1.0 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
---------------------------------------------------------------------
Time 1.25 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
---------------------------------------------------------------------
Time 1.5 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
---------------------------------------------------------------------
Time 1.75 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
---------------------------------------------------------------------
Time 2.0 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
---------------------------------------------------------------------

=====================================================================
Completed: 02/28/2001 03:03:44 PM
```

HYDRAULIC SUMMARY TEST POINT-2

0.0 hours - Hydraulic Summary

Iteration Summary	
Balanced	Trials = 5, Accuracy = 0.000103
Flow Summary	
Flow Supplied	0.00 gpm
Flow Demanded	3,000.00 gpm
Flow Stored	-3,000.00 gpm
Boundary Summary	
VES-UTI-111	Tank: Closed Or Stagnant, Tank Level = 35.00 ft
VES-UTI-112	Tank: Emptying, Tank Level = 35.00 ft
Pipe Summary	
P-211	Check Valve?: Open
P-421	Check Valve?: Open
P-423	Check Valve?: Open
Pump Summary	
Pump 672	Pump: Off
PMP-673	Pump: On

** Warnings and Information **

>>>> Warning: The following elements are disconnected (isolated) from the system, as by closed pipes, pumps, and valves:

0.25 hours - Hydraulic Summary

Iteration Summary	
Balanced	Trials = 1, Accuracy = 0.000001
Flow Summary	
Flow Supplied	0.00 gpm
Flow Demanded	3,000.00 gpm
Flow Stored	-3,000.00 gpm
Boundary Summary	
VES-UTI-111	Tank: Closed Or Stagnant, Tank Level = 35.00 ft
VES-UTI-112	Tank: Emptying, Tank Level = 32.87 ft
Pipe Summary	
P-211	Check Valve?: Open
P-421	Check Valve?: Open
P-423	Check Valve?: Open
Pump Summary	
Pump 672	Pump: Off
PMP-673	Pump: On

** Warnings and Information **

>>>> Warning: The following elements are disconnected (isolated) from the system, as by closed pipes, pumps, and valves:

0.5 hours - Hydraulic Summary

Iteration Summary	
Balanced	Trials = 1, Accuracy = 0.000001
Flow Summary	
Flow Supplied	0.00 gpm
Flow Demanded	3,000.00 gpm
Flow Stored	-3,000.00 gpm

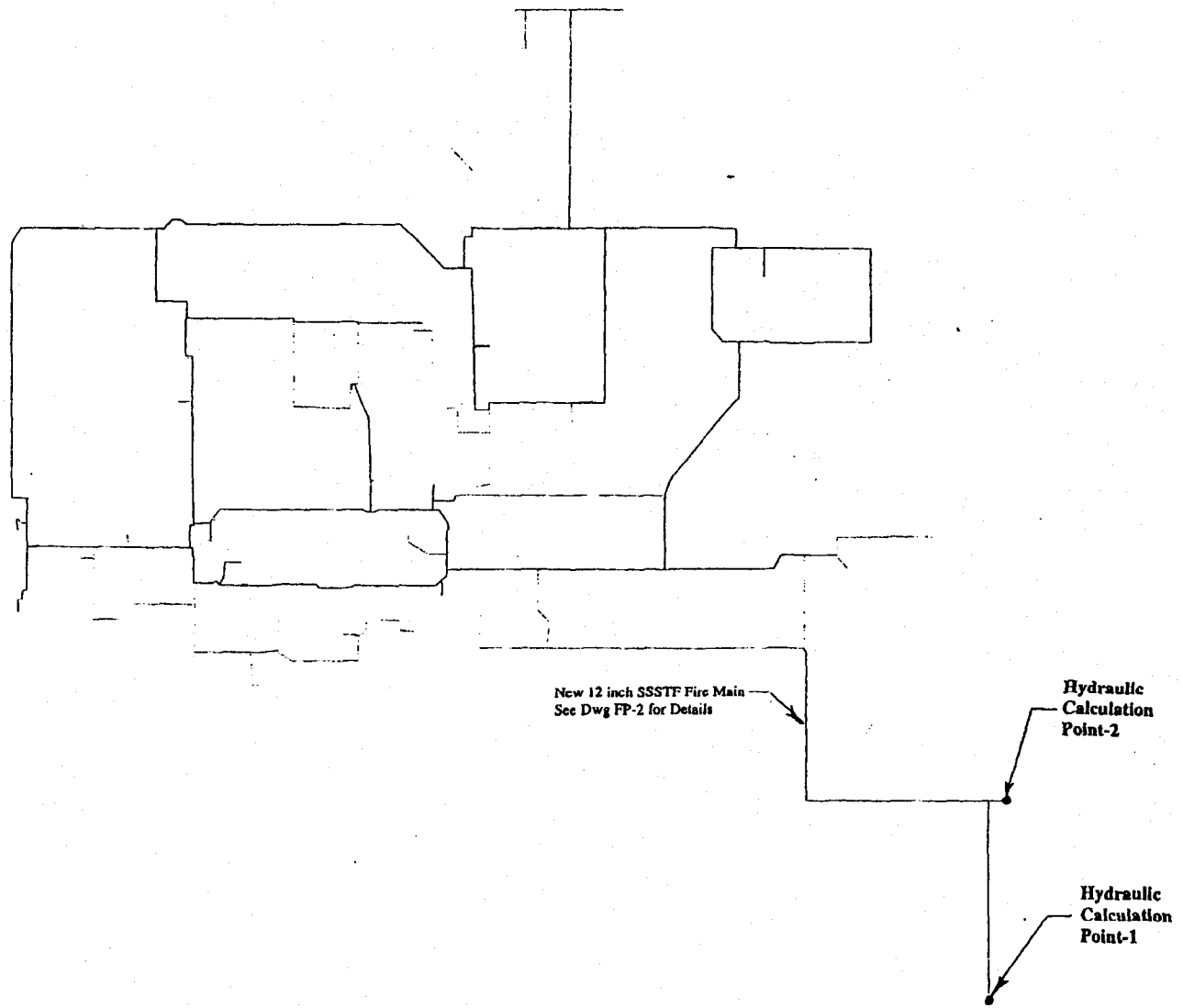
```
---------------------------------------------------------------
 Boundary Summary
 VES-UTI-111      Tank: Closed Or Stagnant, Tank Level = 35.00 ft
 VES-UTI-112      Tank: Emptying, Tank Level = 30.74 ft
---------------------------------------------------------------
 Pipe Summary
 P-211            Check Valve?: Open
 P-421            Check Valve?: Open
 P-423            Check Valve?: Open
---------------------------------------------------------------
 Pump Summary
 Pump 672         Pump: Off
 PMP-673          Pump: On
---------------------------------------------------------------
 ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
 from the system, as by closed pipes, pumps, and valves:

===============================================================
0.75 hours - Hydraulic Summary
---------------------------------------------------------------
 Iteration Summary
 Balanced         Trials = 1, Accuracy = 0.000001
---------------------------------------------------------------
 Flow Summary
 Flow Supplied    0.00 gpm
 Flow Demanded    3,000.00 gpm
 Flow Stored      -3,000.00 gpm
---------------------------------------------------------------
 Boundary Summary
 VES-UTI-111      Tank: Closed Or Stagnant, Tank Level = 35.00 ft
 VES-UTI-112      Tank: Emptying, Tank Level = 28.62 ft
---------------------------------------------------------------
 Pipe Summary
 P-211            Check Valve?: Open
 P-421            Check Valve?: Open
 P-423            Check Valve?: Open
---------------------------------------------------------------
 Pump Summary
 Pump 672         Pump: Off
 PMP-673          Pump: On
---------------------------------------------------------------
 ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
 from the system, as by closed pipes, pumps, and valves:

===============================================================
1.0 hours - Hydraulic Summary
---------------------------------------------------------------
 Iteration Summary
 Balanced         Trials = 1, Accuracy = 0.000001
---------------------------------------------------------------
 Flow Summary
 Flow Supplied    0.00 gpm
 Flow Demanded    3,000.00 gpm
 Flow Stored      -3,000.00 gpm
---------------------------------------------------------------
 Boundary Summary
 VES-UTI-111      Tank: Closed Or Stagnant, Tank Level = 35.00 ft
 VES-UTI-112      Tank: Emptying, Tank Level = 26.49 ft
---------------------------------------------------------------
 Pipe Summary
 P-211            Check Valve?: Open
 P-421            Check Valve?: Open
 P-423            Check Valve?: Open
---------------------------------------------------------------
 Pump Summary
 Pump 672         Pump: Off
 PMP-673          Pump: On
```

```
    ----------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

================================================================
1.25 hours - Hydraulic Summary
    ----------------------------------------------------------------
     Iteration Summary
     Balanced        Trials = 1, Accuracy = 0.0
    ----------------------------------------------------------------
     Flow Summary
     Flow Supplied   0.00 gpm
     Flow Demanded   3,000.00 gpm
     Flow Stored     -3,000.00 gpm
    ----------------------------------------------------------------
     Boundary Summary
     VES-UTI-111     Tank: Closed Or Stagnant, Tank Level = 35.00 ft
     VES-UTI-112     Tank: Emptying, Tank Level = 24.36 ft
    ----------------------------------------------------------------
     Pipe Summary
     P-211           Check Valve?: Open
     P-421           Check Valve?: Open
     P-423           Check Valve?: Open
    ----------------------------------------------------------------
     Pump Summary
     Pump 672        Pump: Off
     PMP-673         Pump: On
    ----------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

================================================================
1.5 hours - Hydraulic Summary
    ----------------------------------------------------------------
     Iteration Summary
     Balanced        Trials = 1, Accuracy = 0.0
    ----------------------------------------------------------------
     Flow Summary
     Flow Supplied   0.00 gpm
     Flow Demanded   3,000.00 gpm
     Flow Stored     -3,000.00 gpm
    ----------------------------------------------------------------
     Boundary Summary
     VES-UTI-111     Tank: Closed Or Stagnant, Tank Level = 35.00 ft
     VES-UTI-112     Tank: Emptying, Tank Level = 22.23 ft
    ----------------------------------------------------------------
     Pipe Summary
     P-211           Check Valve?: Open
     P-421           Check Valve?: Open
     P-423           Check Valve?: Open
    ----------------------------------------------------------------
     Pump Summary
     Pump 672        Pump: Off
     PMP-673         Pump: On
    ----------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

================================================================
1.75 hours - Hydraulic Summary
    ----------------------------------------------------------------
     Iteration Summary
     Balanced        Trials = 1, Accuracy = 0.000001
    ----------------------------------------------------------------
     Flow Summary
     Flow Supplied   0.00 gpm
```

```
     Flow Demanded   3,000.00 gpm
     Flow Stored     -3,000.00 gpm
    ------------------------------------------------------------
     Boundary Summary
     VES-UTI-111     Tank: Closed Or Stagnant, Tank Level = 35.00 ft
     VES-UTI-112     Tank: Emptying, Tank Level = 20.11 ft
    ------------------------------------------------------------
     Pipe Summary
     P-211           Check Valve?: Open
     P-421           Check Valve?: Open
     P-423           Check Valve?: Open
    ------------------------------------------------------------
     Pump Summary
     Pump 672        Pump: Off
     PMP-673         Pump: On
    ------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

============================================================
2.0 hours - Hydraulic Summary
    ------------------------------------------------------------
     Iteration Summary
     Balanced        Trials = 1, Accuracy = 0.0
    ------------------------------------------------------------
     Flow Summary
     Flow Supplied   0.00 gpm
     Flow Demanded   3,000.00 gpm
     Flow Stored     -3,000.00 gpm
    ------------------------------------------------------------
     Boundary Summary
     VES-UTI-111     Tank: Closed Or Stagnant, Tank Level = 35.00 ft
     VES-UTI-112     Tank: Emptying, Tank Level = 17.98 ft
    ------------------------------------------------------------
     Pipe Summary
     P-211           Check Valve?: Open
     P-421           Check Valve?: Open
     P-423           Check Valve?: Open
    ------------------------------------------------------------
     Pump Summary
     Pump 672        Pump: Off
     PMP-673         Pump: On
    ------------------------------------------------------------
     ** Warnings and Information **
>>>> Warning: The following elements are disconnected (isolated)
     from the system, as by closed pipes, pumps, and valves:

============================================================
Message Summaries
============================================================
Time 0.0 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
------------------------------------------------------------
Time 0.25 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
------------------------------------------------------------
Time 0.5 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
------------------------------------------------------------
Time 0.75 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
```

```
     closed pipes or pumps.
-------------------------------------------------------------------
Time 1.0 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
-------------------------------------------------------------------
Time 1.25 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
-------------------------------------------------------------------
Time 1.5 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
-------------------------------------------------------------------
Time 1.75 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
-------------------------------------------------------------------
Time 2.0 hrs
>>>> Warning:
     Nodes are disconnected (isolated) from the system, as by
     closed pipes or pumps.
-------------------------------------------------------------------

===================================================================
Completed: 02/28/2001 03:06:11 PM
```

INTEC Fire Water System
With Proposed SSSTF Underground Fire Main Attached

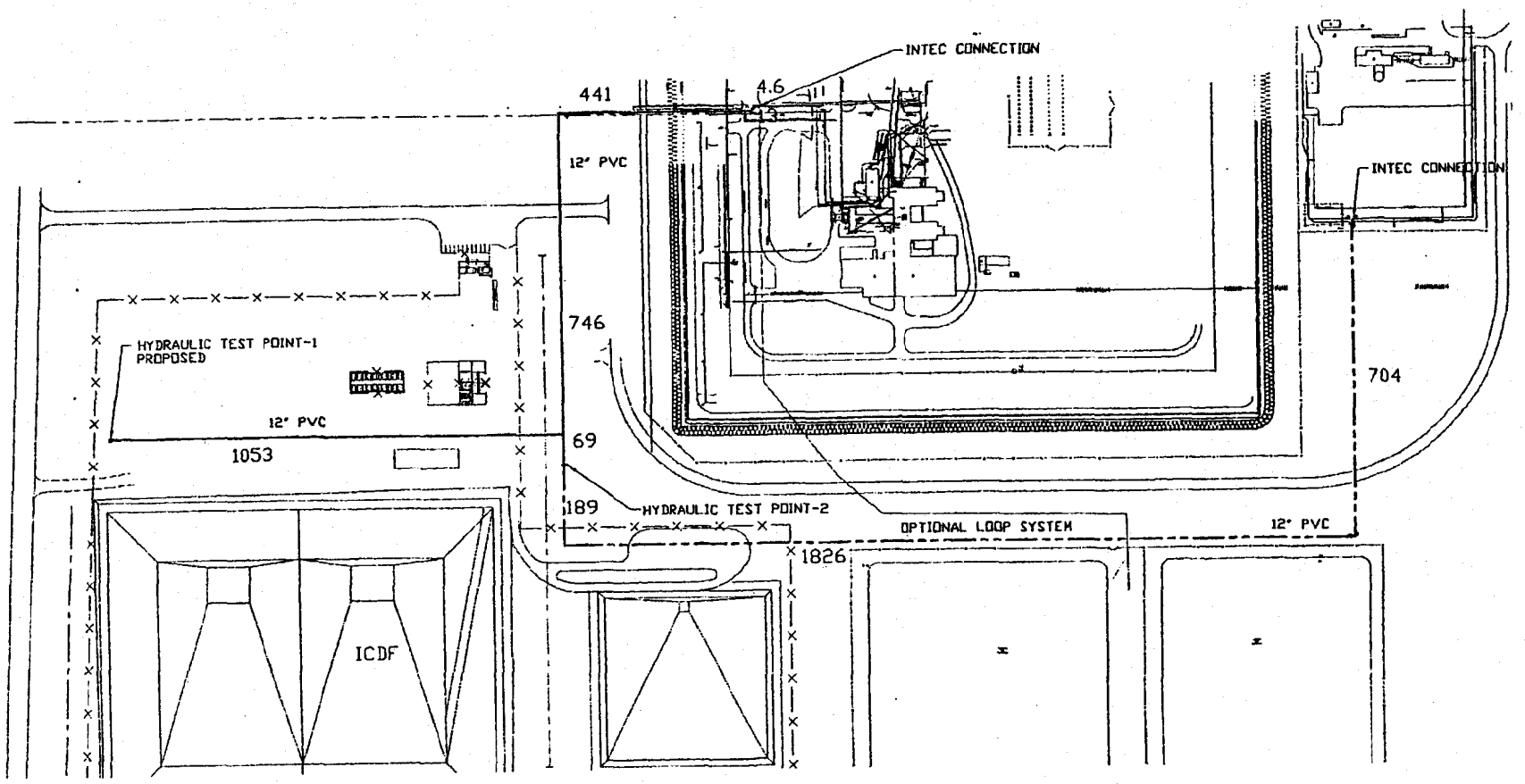


Drawing No. FP-1

Title: INTEC Fire Water System
d:\haestad\wtr\sssttf water system option.wcd
02/28/01 03:00:26 PM

Bechtel BWXT Idaho, LLC
 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Charles McKnight
WaterCAD v4.1.1 [4.2014]



SSSTF PROPOSED UNDERGROUND FIRE MAIN

Drawing No. FP-2